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## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

23 October 2000 (23.10.00)

International application No.

PCT/GB00/00301

Applicant's or agent's file reference

RECP51946001

International filing date (day/month/year)

02 February 2000 (02.02.00)

Priority date (day/month/year)

11 February 1999 (11.02.99)

Applicant

GILES, Roger

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

08 September 2000 (08.09.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

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## PCT

REC'D 20 JUN 2001

WIPO PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference RECP51946001	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/00301	International filing date (day/month/year) 02/02/2000	Priority date (day/month/year) 11/02/1999
International Patent Classification (IPC) or national classification and IPC H01J49/04		
Applicant MASSLAB LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  08/09/2000	Date of completion of this report  18.06.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Centmayer, F  Telephone No. +49 89 2399 2167 

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB00/00301

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

11 as originally filed

**Claims, No.:**

1-8 as received on 07/02/2001 with letter of 06/02/2001

**Drawings, sheets:**

1/1 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB00/00301

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes:	Claims	1-8
	No:	Claims	

Inventive step (IS)	Yes:	Claims	1-8
	No:	Claims	

Industrial applicability (IA)	Yes:	Claims	1-8
	No:	Claims	

2. Citations and explanations  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

Reference is made to the following documents:

D1: US-A-5 756 994

D2: GB-A-2 324 906

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. D1 (see in particular the places indicated in the Search Report) describes an ion source for a mass spectrometer, wherein an atmospheric pressure sample ioniser (21) is operable at atmospheric pressure to provide a sample flow containing desired sample ions. The ion source comprises an interface chamber (3,15,4) having an entrance aperture (10), and exit aperture (11) and an exhaust port (6). The entrance aperture is arranged to receive sample ions provided by the atmospheric pressure sample ioniser, and the exit aperture is arranged for sample ions to exit the interface chamber to the mass spectrometer. A vacuum pump is in communication with the exhaust port of the interface chamber to hold the pressure thereof at a pressure intermediate the operating pressure of the mass spectrometer and the atmospheric pressure. The interface chamber defines a flow passage for gas and entrained sample ions from the entrance aperture to the exhaust port. The exit aperture is located in the flow passage between the entrance aperture and the exhaust port. The flow passage is shaped to cause substantially all the gas and entrained sample ions entering the entrance aperture to flow along trajectories (14) within a distance "d" (about 1 mm) of the exit aperture. Since the diameter of the exit aperture is 0.5, 1.0 or 1.5 mm and d is about 1 mm, d is less than five times the diameter of the exit aperture. The ion source according to claim 1 is different from the ion source described in D1 in that there is no line of sight between the entrance and the exit apertures.

D2 (see in particular the places indicated in the Search Report) describes an ion

source for a mass spectrometer, wherein an atmospheric pressure sample ioniser (2) is operable at atmospheric pressure to provide a sample flow containing desired sample ions. The ion source comprises an interface chamber (3,4) having an entrance aperture (5), and an exit aperture (7) and an exhaust port (19). The entrance aperture is arranged to receive sample ions provided by the atmospheric pressure sample ioniser, and the exit aperture is arranged for sample ions to exit the interface chamber to the mass spectrometer. A vacuum pump (30) is in communication with the exhaust port of the interface chamber to hold the pressure thereof at a pressure intermediate the operating pressure of the mass spectrometer and the atmospheric pressure. The interface chamber defines a flow passage for gas and entrained sample ions from the entrance aperture to the exhaust port. There is no line of sight between the entrance and the exit apertures. In the ion source described in D2, the exit aperture is located in a dead region within the interface chamber of no net gas flow (see page 5, line 29 to page 4, line 3)

The ion source according to claim 1 is therefore different from the ion source described in D2 in that the exit aperture is located in the flow passage between the entrance aperture and the exhaust port. Furthermore, the flow passage is shaped to cause substantially all the gas and entrained sample ions entering the entrance aperture to flow along trajectories (14) within a distance "d" of the exit aperture, where d is less than five times the diameter of the exit aperture.

The ion source according to claim 1 is therefore new.

2. The problem to be solved by the present invention may be regarded as providing an ion source for a mass spectrometer which allows the mass spectrometer to be operated at low pressure (see page 4, lines 36-38 of the description). This is obtained according to the application by locating the exit aperture in the flow passage with no line of sight to the entrance aperture.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Even if the person skilled in the art gathered from D2 that there should be no line of sight between the exit and the entrance aperture, he would not locate The exit

aperture in the flow passage of the gas because D2 suggests that the exit aperture should be in a dead region.

3. Claims 2-8 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

**Re Item VIII**

**Certain observations on the international application**

1. It appears to be necessary that means are necessary for deviating ions from the stream from the entrance aperture to the exhaust, e.g. the features of claim 8. Since independent claim 1 does not contain features defining such means it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.
2. Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
3. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

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**CLAIMS:**

1. An ion source for a mass spectrometer which operates at a low pressure comprising:

an atmospheric pressure sample ioniser operable  
5 at atmospheric pressure to provide a sample flow containing desired sample ions;

an interface chamber having an entrance aperture, an exit aperture and an exhaust port, the entrance aperture being arranged to receive sample ions  
10 provided by the atmospheric pressure sample ioniser entrained in a gas flow, and the exit aperture being arranged for sample ions to exit the interface chamber to the mass spectrometer; and

a vacuum pump in communication with the exhaust  
15 port of the interface chamber to hold the pressure thereof at a pressure intermediate the operating pressure of the mass spectrometer and atmospheric pressure; the interface chamber defining a flow passage for gas and entrained sample ions from the  
20 entrance aperture to the exhaust port, the exit aperture being located in the flow passage between the entrance aperture and the exhaust port, wherein the flow passage is shaped to cause substantially all the gas and entrained sample ions entering the entrance  
25 aperture to flow within a distance "d" of the exit aperture, where d is less than five times the diameter of the exit aperture, and to provide no line of sight between the entrance and exit apertures.

30 2. An ion source as claimed in claim 1, in which the interface chamber has a bend therein to introduce turbulence into the flow of gas and entrained sample ions as they flow along the said flow passage.

35 3. An ion source as claimed in claim 1 or claim 2, in which the interface chamber has a first passage adjacent the entrance aperture, and a second passage adjacent the exit aperture, the first and



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second passages communicating with each other and intersecting at an angle of approximately 90° to each other.

5           4.    An ion source as claimed in claim 1, in  
which a part of the interface chamber between the  
entrance and exit apertures is of smaller sectional  
area than the remainder of the interface chamber such  
that the net flow of sample ions between the entrance  
10           and exit apertures is throttled.

          5.    An ion source as claimed in claim 3, in  
which the first passage adjacent the entrance aperture  
is of smaller sectional area than that of the second  
15           passage adjacent the exit aperture such that the net  
flow of sample ions between the entrance and exit  
apertures is throttled.

          6.    An ion source as claimed in claim 3 or claim  
20           5, in which both the first passage and the second  
passage have a length substantially longer than their  
respective widths.

          7.    An ion source as claimed in any one of the  
25           preceding claims, in which the exit aperture comprises  
a frusto-conical hole formed within a block defining  
the interface chamber, the exit aperture further  
comprising a correspondingly frusto-conical insert  
member, the insert member having a bore therethrough  
30           to permit passage of sample ions and being coaxially  
aligned with the frusto-conical hole in the block.

          8.    An ion source as claimed in claim 7, in  
which the insert member is electrically insulated from  
35           the block.

          9.    An ion source substantially as herein  
described with reference to the accompanying drawing.

## ENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>RECP51946001</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 00/ 00301</b>	International filing date (day/month/year) <b>02/02/2000</b>	(Earliest) Priority Date (day/month/year) <b>11/02/1999</b>
Applicant <b>MASSLAB LIMITED et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

## 4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

## 5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

## 6. The figure of the drawings to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1  
☐ None of the figures.

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H01J49/04

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 756 994 A (BAJIC STEVAN) 26 May 1998 (1998-05-26) cited in the application column 6, line 14-42; figures 1,2,4,5 ---	1
A	GB 2 324 906 A (MASSLAB LIMITED) 4 November 1998 (1998-11-04) cited in the application page 12, line 11-31; figures 1-3 -----	1

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

10 May 2000

Date of mailing of the international search report

16/05/2000

Name and mailing address of the ISA

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Authorized officer

Centmayer, F

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/00301

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5756994 A	26-05-1998	CA 2192915 A	15-06-1997
		DE 19652021 A	19-06-1997
		GB 2308227 A, B	18-06-1997
		JP 9190795 A	22-07-1997
GB 2324906 A	04-11-1998	CA 2259352 A	05-11-1998
		EP 0912988 A	06-05-1999
		WO 9849710 A	05-11-1998